

REMARKS

Applicants respectfully request further examination and reconsideration in view of the above amendments and the comments set forth fully below. Claims 13-34 were pending. Within the Office Action, Claims 13-34 have been rejected. By the above amendment, Claims 13 and 27 have been amended. The amendments to Claims 13 and 27 are supported by the specification, paragraphs [0001] and [0007] and Figure 2e wherein the thin film transistor is applied to TFT-LCD and the primary gate 24 and the secondary gate 27 are electrically connected. Therefore, there is no new matter added therein. Accordingly, Claims 13-34 are now pending.

Rejections Under 35 U.S.C. § 103

Within the Office Action, Claims 13-34 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Korean Publication No. 2001036727 (hereinafter referred to as the “Korean Publication”) in view of U.S. Patent No. 5,693,549 to Kim (hereinafter referred to as “Kim”). The applicants respectfully disagree. The Korean Publication discloses a non-volatile memory device, which is provided to improve the program efficiency of a memory device by generating thermoelectrons from a source region. The non-volatile memory device has the floating gate (23) formed on the gate insulating layer (22), the conductive side wall (25), and the control gate (30). [Korean Publication, abstract and representative figure] However, the floating gate (23) and the conductive side wall (25) in the Korean Publication are totally different from the primary gate and secondary gate of the present invention. In the Korean Publication, the floating gate (23) is a distinct feature of non-volatile memory device. The word “floating” means that the floating gate is in a state of floating or free of wire connection. But in the present invention, as the amended Claims 13 and 27 recite, the secondary gate is electrically connected to the primary gate. Thus, the primary gate of the present invention is not a floating gate. For a closer look, please refer to Figure 2(e) of the present specification, the primary gate 24 and the secondary gate 27 are connected via such contact. In addition, one driving voltage V_{GS} is needed between the primary gate 24 and the secondary gate 27, which is completely unmentioned in the Korean Publication and Kim.

Kim discloses a thin film transistor applied to SRAM (a volatile memory) to prevent short channel effect. As shown in Figures 3 and 5 of Kim, the primary gate (23, 33) is directly and totally put on the primary insulating layer (22, 32), so that the thicker insulating layer or any overlapping, including primary insulating layer and secondary insulating layer of the present

invention, can not be found in the teachings of Kim. Moreover, the cap oxide film (24, 34) is put directly on the primary gate (23, 33) so that the primary gate (23, 33) is isolated in a floating state. That is to say, the primary gate is free of a wire connection. But in the present invention, the primary gate 24 and the secondary gate 27 are electrically connected, as recited in the amended Claims 13 and 27. Accordingly, Kim which is applied to a SRAM memory device, discloses neither a wire connection between the primary gate and the secondary gate nor the thicker insulating layer. Therefore, the thin film transistor of Kim, applied to SRAM memory, is different from that of the present invention, applied to TFT-LCD.

For clearly illustrating the present invention, the Claims 13 and 27 have been amended to incorporate that the thin film transistor is applied to TFT-LCD, which is different from that of the Korean Publication, which is applied to non-volatile memory, and that of Kim, which is applied to SRAM (volatile memory). As recited in the present Claims 13 and 27, the secondary insulating layer is disposed on the primary insulating layer so that a thicker gate insulating layer is formed in the vicinity of the drain and source region. By providing the thicker gate insulating layer, the electric field of the drain region is reduced and the problem of the high off-state leakage current while the TFT-LCD is shut down is improved. However, the Korean Publication is focused on improving the program efficiency of non-volatile memory, such as EPROM, EEPROM, Flash, etc., and Kim is focused on reducing the short channel effect of SRAM (volatile memory), which does not consider the thicker gate insulating layer. As to the Korean Publication, the gate insulating layer (22) is not designed for preventing TFT-LCD from the leakage current, but keeping or trapping a charge generated from the source region of the memory device in the floating gate. That is why one skilled in the art would not have considered overlapping the secondary insulating layer and the gate insulating layer to reduce the electric field of the drain region, as the present invention is focused on, since the cited references are applied to different fields to solve different problems, and the basic arrangements and electrical properties of the thin film transistors are different. The thin film transistor of the present invention, with the thicker gate insulating layer, the primary gate and the secondary gate is not easily conceived by one skilled in the art.

The cited references of the Korean Publication and Kim do not disclose the thin film transistor applied to TFT-LCD, but are focused on different fields of SRAM and non-volatile memory to solve different problems. The different structures of thin film transistors will result in different improvements of electrical properties. The present invention is distinct from the cited references and cannot be achieved through the teaching of the cited references. Therefore, the

Applicant respectfully submits that the present invention should be patentable over the cited references.

The independent Claim 13 is directed to a structure of a thin film transistor applied to TFT-LCD. The structure of Claim 13 comprises an insulating substrate, a source/drain layer disposed on said insulating substrate, a primary insulating layer disposed on said source/drain layer, a primary gate disposed on said primary insulating layer, a second insulating layer disposed on said primary insulating layer and a secondary gate disposed on said secondary insulating layer and insulated from said primary gate via said secondary insulating layer, and electrically connected to said primary gate. As discussed above, neither the Korean Publication, Kim nor their combination teaches a structure of a thin film transistor applied to TFT-LCD. Further, neither the Korean Publication, Kim nor their combination teach a secondary gate that is electrically connected to said primary gate. For at least these reasons, the independent Claim 13 is allowable over the teachings of the Korean Publication, Kim and their combination.

Claims 14-26 are dependent on the independent Claim 13. As discussed above, the independent Claim 13 is allowable over the teachings of the Korean Publication, Kim and their combination. Accordingly, Claims 14-26 are all also allowable as being dependent on an allowable base claim.

The independent Claim 27 is directed to a structure of a thin film transistor applied to TFT-LCD. The structure of Claim 27 comprises an insulating substrate, a source/drain layer disposed on said insulating substrate, a primary insulating layer disposed on said source/drain layer, a primary gate disposed on said primary insulating layer, at least a secondary insulating layer disposed on said primary insulating layer and at least a secondary gate disposed on said at least a secondary insulating layer and insulated from said primary gate via said at least a secondary insulating layer, and electrically connected to said primary gate. As discussed above, neither the Korean Publication, Kim nor their combination teaches a structure of a thin film transistor applied to TFT-LCD. Further, neither the Korean Publication, Kim nor their combination teach a secondary gate that is electrically connected to said primary gate. For at least these reasons, the independent Claim 27 is allowable over the teachings of the Korean Publication, Kim and their combination.

Claims 28-34 are dependent on the independent Claim 27. As discussed above, the independent Claim 27 is allowable over the teachings of the Korean Publication, Kim and their combination. Accordingly, Claims 28-34 are all also allowable as being dependent on an allowable base claim.

Should the Examiner have any questions or comments, they are encouraged to call the undersigned at (408) 530-9700 to discuss the same so that any outstanding issues can be expeditiously resolved.

Respectfully submitted,
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